Legend of the Galactic Heroes

Background

In 2801 AD, the Galactic Federation is formed, which results in political power moving away from the planet Earth (now named Terra) and the Universal Calendar (UC) replacing the Gregorian calendar. The human start to expand their territory into the depths of the Milky Way.
In 799 UC, a battle broke out between two major military alliances, the Free Planet Alliance and the Empire at Vermilion Starzone. Alliance admiral Yang Wen-li led an attack against Reinhard von Lohengramm's fleet in an attempt to destroy the Brunhild and throw the invading Imperial fleets into confusion and disarray.

Description

Admiral Yang is quite good at organizing and embattling his army and often wins. In this final battle, he divides Vermilion Starzone into 30000 colomn numbered $1 \ldots 30000$. Then he numbers his battlebattleship with $1 \ldots 30000$ as well and places the i-th battleship at the i-th colomn to form a line formation. When the enemy is engaging, Admiral Yang will issue multiple **`"gathering"`** orders to gather most of his battleships to some particular columns for intensive attack.

A **`"gathering"`** order is in the form of `M i j` , meaning that all the battleships in the same battle group of the i-th battleship move as a whole **(the order doesn't change)** to the **tail** of the battle group of the j-th battleship. Here a battle group denotes all battleships in a same column.

However, Reinhard is so experienced that he has already take the initiative strategically. During the battle, he is able to monitor Yang's movement orders at any time through a huge intellegence network. When Yang is ordering his fleet, Reinhard will send some queries to keep abreast of Yang's arrangement.

A query from Reinhard is in the form of `C i j` , indicating that Reinhard would like to know whether the i-th and the j-th battleship in Yang's fleet are in the same column. If so, he wants to know the number of battleships between these two battleship.

As a senior programmer, you are asked to write a programme to analyze Yang's orders as well as answer Reinhard's queries at the same time.

Input

The first line contains one integer N , indicating the total number of instructions of order or query.

Then follows N lines, the i-th line contains the content of the i-th instruction, which is in one of the two given formats:

1. `M i j` : i and j are two integers, denoting the two battleships involved in this order Yang issues. It is guaranteed that the i-th and the j-th battleships are not in the same column when this order is issued.
2. `C i j` : i and j are two integer denoting the two battleships involved in this query that Reinhard would like to know their information.

Output

Process all the input instructions in order:

If it is Yang's order, the arrangement of his fleet changes. Your programme should notice that but print nothing.

If it is Reinhard's query, print a single integer in one line denoting the number of battleships between the i-th and the j-th battleship in the same column currently. Print `-1` if the i-th and the j-th battleship are not in the same column.

Sample Input/Output

Input

```
4
M 2 3
C 1 2
M 2 4
C 4 2
```

Output

```
-1
1
```

Sample Explanation

Table of positions of battleships is as following.

	Column 1	**Column 2**	**Column 3**	**Column 4**	**...**
Initial	1	2	3	4	...
`M 2 3`	1		3 2	4	...
`C 1 2`	Print `-1` as 1-th battleship is not in the same column of 2-th battleship				
`M 2 4`	1			4 3 2	...
`C 4 2`	Print `1` as there's 1 battleship (3-th) between 4-th battleship and 2-th battleship				

Constraint

$1 \leq N \leq 2 \cdot 10^5$.

In each instruction, $1 \leq i, j \leq 30000$.